

have its centre shifted 8 A.U. towards the red. Prof. Hartmann deduces from this "shift" that the material emitting these bright line radiations is moving away from the earth with a velocity of 520 kilometres per second. The spectrum is similar to that of Nova Persei during the latter part of March, 1901, and this fact, taken with the similar decrease of magnitude, seems to prove that the object is truly a Nova.

The magnitude was estimated at Strassburg on March 27, 13h. (M.T. Strassburg) as 7.9, and at Utrecht on March 27, 11h. 20m. (M.T. Utrecht) as 8.1.

COOPERATIVE DETERMINATIONS OF VELOCITIES IN THE LINE OF SIGHT.—At a meeting of the Royal Astronomical Society held on March 13, Mr. Newall read a paper dealing with the results obtained at Cambridge in connection with Prof. Frost's cooperative scheme for determining the motions in the line of sight of ten selected stars.

Mr. Newall's results dealt with the stars α Arietis, α Persei, and α Boötis, and for the first named he has obtained a mean value of -14.23 kilometres per second. The measurements of the spectrum of α Persei seem to indicate that there is something peculiar, which is not yet accounted for, in the motion of this star. Fourteen photographs give a mean velocity of -2.61 kilometres per second with a probable error of ± 0.28 . In the case of α Boötis four of the lines, out of the seventeen which were measured, give a velocity of an entirely different order from that given by the other thirteen lines, although the lines themselves are not remarkable in other respects; two of these lines belong to the iron, one to the scandium, and one to the titanium spectrum (the *Observatory*, April).

WOLF'S RICH NEBULOUS REGION IN THE CONSTELLATION LYNX.—Writing to No. 3857 of the *Astronomische Nachrichten*, Dr. Isaac Roberts states that he photographed both H. iv55 and the new nebula mentioned by Prof. Max Wolf (*Astronomische Nachrichten*, 3847) on March 24, 1897, and included them amongst the regions given in his observatory report which appeared in the *Monthly Notices* for February, 1898.

Dr. Roberts's notes describe the second nebula as 45s. following and $14'5$ S. of H. iv55, and state that "it is a spiral nebula viewed edgewise, about $285''$ of arc in diameter from south following to north preceding: nucleus stellar, equal to about seventeenth magnitude, faint indications of condensations."

THE PERIOD AND LIGHT-CURVE OF δ CEPHEI.—In No. 3853 of the *Astronomische Nachrichten* Prof. A. A. Nijland discusses the previous observations and calculations of the period and light-curve of the interesting variable δ Cephei (Ch. 8073). He compares the maxima given by his own formula and that of Schur with the chief observations made between February, 1785, and February, 1897, and arrives at the following formula as the one giving the nearest approximation to the true period:—

Maximum = 1840 September 26d. 10h. 6.2m. (M.T. Bonn)
 $+5d. 8h. 47m. 45.0005E - 0.00075SE^2 - 0.00000062 E^3$,

or, expressed in Julian Days:—

Maximum = J.D. 2393375.421 (M.T. Bonn)
 $+5.366493dE - 0.00075SE^2 - 0.00000062 E^3$.

Prof. Nijland has found during the discussion of the data that a variation of the period is suggested, and he urges the desirability of obtaining further trustworthy observations.

CONSTITUTION OF A BOARD OF SCIENTIFIC ADVICE FOR THE FURTHERANCE OF SCIENTIFIC WORK IN INDIA.

SUBJOINED is the complete text of the resolution of the Government of India referring to the appointment of a Board of Scientific Advice to organise and coordinate the scientific work done in the several Departments of the Government of India.

The application of the resources of modern science to the economic and agricultural development of the country has for many years engaged the earnest attention of the Government of India. The Famine Commissioners of 1878 laid much stress on the institution of scientific inquiry and

experiment designed to lead to the gradual increase of the food-supply of the country and to the greater stability of agricultural outturn. It was considered desirable, however, first to organise the Land Record system, and so to acquire a stable basis of ascertained fact, before scientific inquiry was undertaken on any considerable scale. The necessity for such investigation was again emphasised by Dr. Voelcker, who was deputed in 1890 to advise the Indian Government on the best course to be adopted in order to effect improvements in Indian Agriculture. At the same time the experience of recent years has indicated the increasing importance of the study of the economic products of India and of its mineral-bearing tracts, with a view to the development of the industrial and economic resources of the country.

(2) The organisation and work of the Indian Agricultural and Scientific Departments prior to 1897 have been fully described in the important series of Resolutions which issued in that year, and especially in the fourth and fifth Resolutions of the series. These contain a clear exposition of the policy of the Government of India in establishing departments of scientific research to promote the industries of the country and investigate its undeveloped resources, and they describe the means adopted to give effect to that policy. They further show how undue prominence had been given in the past to pure science, to the neglect of its economic application, and they affirm the necessity of extending the economic side of inquiry, and of coordinating the labours of the different departments on the basis of a well-considered working plan.

(3) The policy laid down in these Resolutions has been steadily pursued, though its development has been retarded by an unfavourable cycle of seasons, which seriously affected the financial resources of the Government of India. To the Geological Department two practical mining experts have been added, while each year a portion of the scientific staff devote themselves to inquiries connected with the mineral resources of India. A cryptogamic botanist has been appointed, whose special duty it is to study the fungoid diseases of agricultural staples, such as rust in wheat, which causes such serious and widespread loss to the country. In Madras a botanist has been permanently entertained whose attention will be mainly devoted to economic inquiry. And of late years the attention of the officers of the Botanic Survey has been more and more directed to questions of practical importance to the country. The establishment of the Reporter on Economic Products has been strengthened, and a Curator with special qualifications as an economic chemist has been added to it and provided with a laboratory, while one agricultural chemist pursues his inquiries at Dehra Dun, and it is proposed to procure another for Madras. An entomologist has for some time past been added to the staff of the Indian Museum; a specially qualified Forest officer has been deputed for investigation of the insect pests which devastate the forests, while the Secretary of State has been asked to secure the services of a skilled entomologist in order to conduct similar inquiries in connection with the agricultural and industrial staples of India. In the Civil Veterinary Department a highly skilled bacteriologist is studying the diseases which prove so fatal to agricultural stock in India. An agricultural expert has recently been added to the Provincial staff of the United Provinces. Finally, an Inspector General of Agriculture has been appointed whose function it is to guide and correlate the agricultural inquiries carried on throughout India, whether by the Imperial or the Provincial Governments, and to act as an adviser to both in all matters pertaining to agriculture, while under him work, or will work, the agricultural chemist, the entomologist and the cryptogamic botanist.

(4) The Government of India now desire to provide, as far as possible, for that coordination of scientific inquiry which the development of the machinery of the various departments has rendered more than ever essential. The work of many of the members of the scientific staff covers fields in which experiments of a similar or cognate character are being independently conducted. Thus in chemistry we have several investigators following parallel lines of research; in economic botany there are two departments working independently of each other; in economic entomology

there have been two specialists, each charged with investigations similar in character. Finally, the appointment of an Inspector General of Agriculture adds to the staff an official with a close interest in all the branches of science which bear upon the agricultural conditions of the country.

(5) The subject has received the careful consideration of the Governor General in Council, and he has arrived at the conclusion that a central authority is needed to ensure that the work of scientific research is distributed to the best advantage, that each investigator confines his researches to the subject with which he is most capable of dealing, and that energy is not dissipated by the useless duplication of inquiries or misdirected by a lack of inter-departmental co-operation. The various departments of science are not self-contained, but closely interlinked. Agriculture needs the aid of botany, botany the assistance of geology, geology of chemistry, and an endeavour should be made to combine the different departments in a system of mutual assistance. The Governor General in Council has no wish to imply that there has been any disposition on the part of one department to hold itself aloof from another. But the institution of an authorised scheme of mutual assistance will result in a closer cooperation for the purposes of effective research than has been possible in the past.

(6) A further reason exists for the constitution of a central advisory authority. Though greater prominence has been given in recent years to the practical or economic side of inquiry, its importance is not even yet always adequately recognised. The Government of India fully realise the great value of the work effected in the past by their scientific departments, in the shape of scientific exploration and systematic work, and they recognise that such inquiries must necessarily precede any attempt towards the solution of more practical problems. But in those departments there has been a not unnatural tendency to give the claims of abstract science precedence over the more practically important demands of economic or applied science. In making these remarks, the Governor General in Council has no desire to underrate the importance of original research for purely scientific objects, or to assert that the practical application of science should be the sole aim of technical departments. It is his wish that the high reputation which has been gained by more than one branch of scientific work in India should be maintained, and that the Indian departments should retain touch with scientific progress in Europe and America. But in view of the fact that the Indian Government own the largest landed estate in the world, that the prosperity of the country is at present mainly dependent upon agriculture, that its economic and industrial resources have been very imperfectly explored, and that the funds available for scientific work are limited, the importance of practical research is preeminent, and a central authority, which can speak with knowledge upon scientific questions, will be in a position to enforce the repeated declarations of the Government of India on the subject.

(7) The Governor General in Council proposes therefore to constitute a Board of Scientific Advice comprising the heads of the Meteorological, Geological, Botanical, Forest, Survey, Agricultural, and Veterinary Departments, together with such other scientific authorities as may from time to time be invited by the Government of India to serve upon it. These latter will include scientific officers in the service of the Imperial and Provincial Governments whose special attainments render their assistance desirable. The Government of India hope that the Trustees of the Indian Museum, who, as custodians of the national scientific collections, have always shown an active interest in the prosecution of scientific work, will associate themselves with the scheme, and they will be addressed separately on the subject. The Secretary to the Government of India in the Department of Revenue and Agriculture, to which the scientific departments concerned are administratively subordinate, will be *ex-officio* President of the Board, and the Secretary to the Board will be selected, subject to the approval of Government, by the Board from amongst its members. The Board will review and advise generally upon the operations of the departments, with due attention to the economic side of their work, and will serve as a referee in all matters connected with the organisation of scientific inquiry in this country. It will annually receive and discuss the proposals

of each departmental head in regard to the programme for investigation in his department. In cases where inter-departmental cooperation is necessary, it will rest with the Board to advise as to the lines on which mutual assistance should be given and the department to which the inquiry should primarily appertain. Where the proposed investigation falls exclusively within the domain of a particular department, the function of the Board will be confined to examining and criticising the proposals. It is not intended that the directing influence of the Board should in any way weaken departmental executive control or responsibility, and the precise manner in which, and the agency by which, any required information is to be collected or investigation carried out must be left to the heads of the departments concerned.

(8) The Board will submit annually to Government a general programme of research which will embody the proposals of departmental heads in so far as its subjects are to be exclusively dealt with in one department, and its own proposals in cases where two or more departments are to cooperate. At the end of the year it will submit to Government a brief review of the results obtained in all lines of scientific investigation, based upon the annual departmental reports and upon any papers published by individuals. Generally, the Board will act as an advisory committee to the Government of India and as an intermediary between the Government of India and their scientific officers in respect of all questions of technical research which are dealt with in the Department of Revenue and Agriculture. The Royal Society have already been good enough to offer their aid in furthering scientific work in India, and their invaluable advice and assistance will be freely invoked by the Board now constituted.

(9) To enable the Board to carry out the duties which are assigned to it, the Governor General in Council considers it desirable that its members should meet as a collective body at stated intervals for the purposes of discussion. It will probably be ordinarily sufficient to hold two meetings a year; one to consider the work of the past year and proposals for the programme of the coming year in each department; the other to settle finally those programmes subject to the approval of Government. The most convenient dates for holding these meetings will be settled in consultation with the Board.

- (1) The Surveyor General of India.
- (2) The Inspector General of Forests.
- (3) The Director, Geological Survey of India.
- (4) The Meteorological Reporter to the Government of India and Director General of Indian Observatories.
- (5) The Inspector General, Civil Veterinary Department.
- (6) The Director, Botanical Survey of India.
- (7) The Reporter on Economic Products to the Government of India.
- (8) The Inspector General of Agriculture in India.
- (9) The Director General of Archaeology in India.
- (10) The Chief Inspector of Mines in India.

(11) Ordered, that the Resolution be communicated to all Departments of the Government of India and Local Governments and Administrations for information and to the Departments above noted for information and guidance; and that it be published in the Supplement to the *Gazette of India*.

SOLAR PROMINENCE AND SPOT CIRCULATION, 1872-1901.¹

IN previous numbers of this Journal (vol. lxi. p. 248, and vol. lxvii. pp. 224 and 377) references have been made to the connection between solar, meteorological and magnetic changes, and some of the results obtained from a reduction of the solar prominences as observed by Prof. Tacchini at Rome were described.

Abstract of a paper recently read before the Royal Society by Sir Norman Lockyer, K.C.B., F.R.S., and William J. S. Lockyer, M.A., Ph.D., F.R.A.S.